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16. Abstract –

This report covers Phase Three of a long-term advanced vehicle research program of the Arizona Department of Transportation (ADOT) and its Arizona Transportation Research Center (ATRC). The primary focus of the research has evolved to topics in winter operations. Phase Three, the fifth year of this program, included the 2002-03 winter season.

Phase One of this research (1997-2000) began with intelligent-vehicle concept demonstrations relevant to Arizona's specific transportation needs. These early efforts led to a joint program with California to field-test the Caltrans advanced snowplow (ASP) in Arizona conditions. In 1999 and 2000, over two winters, ADOT crews evaluated California's ASP lane-guidance system in four-week test cycles at a three-mile long two-way test loop of embedded roadway magnets near Flagstaff.

In Phase Two (2000-01), the key goal was to acquire and test a driver-assistance system for an ADOT snowplow. The project selected the 3M Lane Awareness System, and installed 5 miles of 3M magnetic striping tape at a second test site. The partnership with Caltrans was continued to compare both guidance concepts in similar operating conditions. However, system problems with both research snowplows reduced the ability of ADOT and its partners to evaluate either concept.

In Phase Two(b), the 2001-02 winter, ADOT's test and evaluation plans were successful, as the technical issues of the previous winter had been resolved. The key goal of side-by-side plowing operations was hampered by a lack of snowfall during the test period, and the ADOT-3M snowplow's field tests were limited to only a few storms all winter. Overall, both concepts proved their effectiveness and reliability in 2001-02, but the mild weather did not allow the project to document their performance. At this point it was clear to ADOT that the cost of either system was prohibitive, and the research focus for 2002-03 was shifted from roadway-based guidance concepts to commercial on-board warning systems.

In the current Phase Three (2002-03), ADOT expanded the research activities to the "I-40 Corridor" districts east and west of Flagstaff. The project equipped seven snowplows with either collision warning radar or passive infrared night vision, at a much more practical level of cost. With these new units in service on seven snowplow routes across northern Arizona, the project determined winter performance results for both of the commercial on-board warning systems. Despite a mild winter, results for the warning radar were positive overall, but ice buildup in storms hampered the night vision system. Both of these systems were judged to be effective and operationally successful, with certain limitations. Their field deployment in northern Arizona will be extended with some refinements for the 2003-04 winter season.

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